

Application No. 10/616,611
Docket No. DP-308655
Amendment dated October 7, 2005
Reply to Office Action of July 7, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (currently amended): A circuit assembly comprising a substrate and a surface-mount device mounted thereto, multiple electrically-conductive pads present on at least one device attachment region of the substrate, and solder joints bonding the surface-mount device to the pads, the at least one device attachment region and a second region of the substrate being formed of a first material, the surface-mount device comprising a package formed of a second material having a lower coefficient of thermal expansion than the first material, the substrate comprising:

first and second apertures delineating first and second cantilevered members, respectively, within the at least one device attachment region, the first and second cantilevered members being more compliant than the second region of the substrate, the first and second cantilevered members having peripheral borders delineated by the first and second apertures, respectively, each of the first and second cantilevered members having a boundary between

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and not delineated by the first and second apertures, at least a first of the pads being located on the first cantilevered member and at least a second of the pads being located on the second cantilevered member; and

a third aperture within the at least one device attachment region and over which the surface-mount device is mounted, the third aperture being between and discrete from the first and second apertures. ~~having at least one aperture formed therein that is located and configured so as to cause at least a portion of the at least one device attachment region to be more compliant than the second region of the substrate.~~

Claim 2 (currently amended): The circuit assembly according to claim 1, wherein the first and second apertures are not symmetrical about an axis through the third aperture. ~~the at least one aperture comprises first and second apertures, the first and second apertures delineate first and second compliant members, respectively, within the at the least one device attachment region of the substrate, and at least some of the pads are located on the first and second compliant members.~~

Claim 3 (currently amended): The circuit assembly according to claim 1, ~~claim 2,~~ wherein each of the first and second apertures is U-shaped

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in the plane of the substrate.

Claim 4 (currently amended): The circuit assembly according to claim 1, ~~claim 2~~, wherein each of the first and second apertures is C-shaped in the plane of the substrate.

Claim 5 (canceled)

Claim 6 (currently amended): The circuit assembly according to claim 5, wherein the boundaries of the first and second cantilevered ~~compliant~~ members face each other so that a central region of the at least one device attachment region is between the first and second cantilevered ~~compliant~~ members.

Claim 7 (currently amended): The circuit assembly according to claim 6, wherein the ~~further comprising a~~ third aperture is located in the central region of the at least one device attachment region.

Claim 8 (currently amended): The circuit assembly according to claim 7, wherein the third aperture extends into each of the first and second

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cantilevered ~~compliant~~ members separated by the central region.

Claim 9 (currently amended): The circuit assembly according to claim 1, ~~claim 7~~, wherein the third aperture has a substantially rectilinear shape in the plane of the substrate.

Claim 10 (currently amended): The circuit assembly according to claim 1, ~~claim 7~~, wherein the third aperture has a substantially circular shape in the plane of the substrate.

Claim 11 (currently amended): The circuit assembly according to claim 1, ~~claim 2~~, further comprising conductive runners that electrically interconnect the pads on the first and second cantilevered ~~compliant~~ members to the second region of the substrate.

Claim 12 (original): The circuit assembly according to claim 11, wherein at least one of the conductive runners extends along a surface of the substrate between the first and second apertures.

Claim 13 (currently amended): The circuit assembly according to

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claim 11, wherein at least one of the conductive runners is on an surface
defined by at least one of the peripheral borders. ~~extends along an edge of~~
~~one of the first and second apertures.~~

Claim 14 (currently amended): The circuit assembly according to
claim 1, ~~claim 2,~~ wherein the first and second apertures are filled with an
electrically-nonconductive material that differs from the first and second
materials.

Claim 15 (currently amended): A circuit assembly comprising a
substrate and a surface-mount device mounted thereto, multiple electrically-
conductive pads present on at least one device attachment region of the
substrate, and solder joints bonding the surface-mount device to the pads, the
at least one device attachment region and a second region of the substrate
being formed of a first material, the surface-mount device comprising a
package formed of a second material having a lower coefficient of thermal
expansion than the first material, the substrate comprising:

first, second, and third sets of multiple apertures delineating the at
least one device attachment region, the third set of multiple apertures being
between the first and second sets of multiple apertures, the first and third sets

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of multiple apertures delineating a first compliant member therebetween within the at least one device attachment region, the second and third sets of multiple apertures delineating a second compliant member therebetween within the at least one device attachment region, the first and second compliant members being more compliant than the second region of the substrate, at least a first of the pads being located on the first compliant member and at least a second of the pads being located on the second compliant member, the surface-mount device being mounted over the third set of multiple apertures. ~~The circuit assembly according to claim 1, wherein the at least one aperture comprises multiple apertures, a first set of the multiple apertures delineates a first compliant member within the at the least one device attachment region of the substrate, a second set of the multiple apertures delineates a second compliant member within the at the least one device attachment region of the substrate, and at least some of the pads are located on the first and second compliant members.~~

Claim 16 (original): The circuit assembly according to claim 15, wherein each of the multiple apertures is discrete and circular-shaped in the plane of the substrate.

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Claim 17 (currently amended): The circuit assembly according to claim 15, wherein a central region is defined by and between the third set of multiple apertures, ~~first and second compliant members within the at least one device attachment region.~~

Claims 18-27 (canceled)

Claim 28 (currently amended): A circuit assembly comprising a substrate and a surface-mount device mounted thereto, multiple electrically-conductive pads present on at least one device attachment region of the substrate, and solder joints bonding the surface-mount device to the pads, the at least one device attachment region and a second region of the substrate being formed of a first material, the surface-mount device comprising a package formed of a second material having a lower coefficient of thermal expansion than the first material, the substrate comprising: ~~The circuit assembly according to claim 1, wherein the at least one aperture comprises~~
an S-shaped aperture, first and second portions of the S-shaped aperture delineating a first cantilevered ~~delineate a first compliant~~ member within the at the least one device attachment region of the substrate and extending in a first direction, the second portion and an adjacent third portion of

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the S-shaped aperture delineating a second cantilevered ~~delineate a second compliant~~ member within the at the least one device attachment region of the substrate and extending in a second direction opposite the first direction, at least a first of the pads being located on the first cantilevered member and at least a second of the pads being located on the second cantilevered member, the surface-mount device being mounted over the second portion of the S-shaped aperture. ~~and at least some of the pads are located on the first and second compliant members.~~

Claim 29 (currently amended): The circuit assembly according to claim 28, wherein each of the first and second cantilevered ~~compliant~~ members has peripheral borders delineated on three sides by the S-shaped aperture, and each of the first and second cantilevered ~~compliant~~ members has a boundary that is not delineated by the S-shaped aperture so as to be contiguous with the second region of the substrate.

Claim 30 (currently amended): The circuit assembly according to claim 29, wherein the first and second cantilevered ~~compliant~~ members are separated by the second portion of the S-shaped aperture.

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Claim 31 (currently amended): A circuit assembly comprising:

a substrate formed of a first material and comprising a device attachment region and a second region outside the device attachment region;

first and second slots formed in the substrate so as to be separated by the device attachment region, the first and second slots being substantially U-shaped in the plane of the substrate and delineating first and second cantilevered ~~compliant~~ members, respectively, within the device attachment region, the first and second cantilevered ~~compliant~~ members having oppositely-disposed peripheral borders delineated by the first and second slots, respectively, the first and second cantilevered ~~compliant~~ members having boundaries that are not delineated by the first and second slots and are spaced apart by a central region of the device attachment region between the first and second cantilevered ~~compliant~~ members, the first and second cantilevered ~~compliant~~ members being more compliant than the second region of the substrate;

a central aperture within the device attachment region and between and discrete from the first and second slots;

multiple electrically-conductive pads present on the first and second cantilevered ~~compliant~~ members;

a surface-mount device mounted to the first and second cantilevered

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~~compliant~~ members and over the central aperture, the surface-mount device comprising a chip formed of a second material having a lower coefficient of thermal expansion than the first material of the substrate; and
solder joints bonding the surface-mount device to the pads.

Claim 32 (currently amended): The circuit assembly according to claim 31, wherein the first and second slots are not symmetrical about an axis through the central aperture. ~~further comprising an aperture in the central region of the device attachment region.~~

Claim 33 (currently amended): The circuit assembly according to claim 31, ~~claim 32,~~ wherein the central aperture extends into each of the first and second cantilevered ~~compliant~~ members.

Claim 34 (currently amended): The circuit assembly according to claim 31, ~~claim 32,~~ wherein the central aperture has a substantially rectilinear shape in the plane of the substrate.

Claim 35 (currently amended): The circuit assembly according to claim 31, ~~claim 32,~~ wherein the central aperture has a substantially circular

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shape in the plane of the substrate.

Claim 36 (currently amended): The circuit assembly according to claim 31, ~~claim 32~~, further comprising conductive runners that electrically interconnect the pads on the first and second cantilevered ~~compliant~~ members to the second region of the substrate.

Claim 37 (original): The circuit assembly according to claim 36, wherein each of the conductive runners extends along a surface of the substrate between the first and second slots.

Claim 38 (currently amended): The circuit assembly according to claim 36, wherein each of the first and second slots defines an outward surface facing ~~has an outward edge facing away from~~ the device attachment region and an inward surface facing away from ~~edge facing~~ the device attachment region and delineating the peripheral border of its respective first or second cantilevered ~~compliant~~ member, and the conductive runners are continuous on the outward surface and then the inward surface of each of the first and second slots, ~~extend toward the outward edges of the first and second slots~~, ~~continuously follow the outward edges and then the inward edges of the first~~

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~~and second slots,~~ and finally extend to the pads on the first and second
cantilevered ~~compliant~~ members.

Claim 39 (original): The circuit assembly according to claim 31,
wherein the first and second slots are filled with an electrically-nonconductive
material that differs from the first and second materials.